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Original Article

# Kidney Stone Development among Older Adults in Iran

**Hossein Rafiei*, Fariba Malekpoor**, Masoud Amiri*, Mohammad Rahimi Madiseh***, Hedayat Lalegani****

**Abstract**

**Aim:** Incidence and prevalence of kidney stone development have been increased in the recent years. Present study aimed to determine prevalence and risk factors of kidney stone development among adults more than 65 years old.

**Methods:** This cross-sectional study conducted in Kashani Hospital at Shahrekord, Iran. Data on all adults more than 65 years who were admitted to the lithotripsy unit of Kashani hospital in Shahrekord, were derived from medical records, in the period of January 2011 to December 2011.

**Results:** Of 1170 admitted patients to the lithotripsy unit of the hospital, 181 (15.5%) patient were older than 65 years, with 95 female (52.5%) and 86 male (47.5%). Results of independent t test showed significant difference in stone development between male and female patients ($p<0.05$). The age of 73.5% (n=133) of patients were in between 65 to 74 years. Results of ANOVA showed significant difference in stone development between three age groups ($p<0.05$). Rate of patients admission in summer with 34.3% (n=62) was higher than other seasons. Results of ANOVA showed significant difference in stone development between four seasons of year ($p<0.05$).

**Conclusion:** Results of present study showed that the risk of kidney stone development in older people (more than 65) is high. In addition, female sex, age group 65-74 years, region of residence and summer season might be considered as potential risk factors for increasing the risk of kidney stone development.

**Keywords:** Older adult, kidney stone, risk factors, prevalence

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## Introduction

Kidney stones are the third most common as well as painful and costly condition problem in urology clinics after urinary tract infections and prostate diseases.[1,2] It usually affects during productive stage of life between 20 and 50 years of age.[3] The incidence and prevalence of kidney stones is increasing worldwide.[4,5] For example, during the past decade, the incidence of kidney stones in the United States increased from 3.8 to 5.2 percent.[5] There are many factors which can increase the risk of kidney stone development such as male gender, age group 20 to 50 years old, overweight, higher body mass index (BMI), less fluid intake, hot and dry weather, racial background, positive family history, high consumption of dairy products, global warming, dehydration, lower urine volume, high level of calcium, oxalate and cystine in urine, low urine magnesium, high intake of vitamin D and vitamin C, consumption of animal proteins and diseases such as type 2 diabetes, hyperthyroidism, cancer and leukemia.[4-20]

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Previous studies have focused on the causes of kidney stones and the consequences among patients with kidney stone. Taylor et al in the United States surveyed relationship between obesity, weight gain, and the risk of kidney stones development.[6] They reported that weight, body mass index (BMI) and waist circumference (WC) were positively associated with the greater risk of kidney stones.[6] In another study, Romero et al in 2010 have reviewed the prevalence, incidence, and associated risk factors of kidney stones in 7 countries (Italy, Germany, Scotland, Spain, Sweden, United States, and Japan).[5] They reported that risk of kidney stones development is increasing globally.[5] Kidney stone diseases could also affect the health related quality of life of patients.[19,20] For example, Bensalah et al (2008) reported that American patients with kidney stone had lower level of health related quality of life compared to American healthy adults.[22] They also reported that BMI, age and the number of surgical procedures are the most important factors which might impact on health related quality of life in patients with kidney stone.[22]

This problem is also important in Iran. The prevalence of kidney stones in Iran was reported to be 1.9 to 5.7%.[1,21] In one study, Ketabchi et al (2012) found that the rate of opium dependency among patients with recurrent kidney stone was higher in Iran.[22] According to study of Basiri et al on the incidence of urinary stones among 24 Iranian provinces, the rank order of Chahar Mahal and Bakhtiari (our province) was six.[23] In fact, many patients admitted to hospitals of our province due to kidney stones were older patients. However, no study was found to report the rate and risk factors of kidney stones among this group of patients. The aim of our study was to examine the prevalence and risk factors of kidney stones among older patients.

## Methods

This cross-sectional study was conducted in Shahrekord, Iran. Study was approved by ethics committee of the Shahrekord University of Medical Science and the head of Kashani Hospital in Shahrekord. Chaharmahal and Bakhtiari Province is located in the southwest of Iran. Based on the report of Iranian Ministry of Health about seven percent of Chaharmahal and Bakhtiari province population was older than 65 year in 2011.[24] Data of medical records of all adults older than 65 years admitted to the lithotripsy unit of Kashani hospital in Shahrekord City were obtained from January 2011 to December 2011. It should be mentioned that all patients with kidney stones in our province were referred to this hospital. Patients were divided into three groups: young-old (ages 65-74 years), the middle old (ages 75-84 years) and very old (ages >85 years).[25] The data analysis was performed using SPSS (Statistical Package for the Social Sciences) version 17. Descriptive statistics (expressed as mean and standard deviation) were used.

## Results

During 2011, 1170 patients were admitted to the lithotripsy unit of Kashani hospital. In total 70.2% (n=127) of patients lived in urban area. Of them 181 (15.5%) patient were older than 65 years (range = 65-91). All of these hospital admissions were elective admissions. Of these 181 patients, 52.5% were female (n=95) and 47.5% were male (n=86). Results of independent t test showed significant difference in stone development between male and female patients ($p<0.05$). The mean age of patients was 71.6±6.3 years. The age range of 73.5% (n=133), 21% (n=38) and 5.5% (n=10) were between 65 to 74 years, between 75 to 84 years and more than 85 years, respectively. Results of ANOVA test showed significant difference in stone development between three age groups ($P<0.05$). The admission season of 34.3% (n=62) were in summer, 26% (n=47) in winter, 19.9% (n=36) in fall and 19.9% (n=36) in spring. Results of ANOVA test showed significant difference in stone development between four seasons of year ($P<0.05$). Of 181 patient, 71.8% (n= 130) had medical. In total, 94.5% (n=171) patient were married and rest were single.

## Discussion

Kidney stones are common and an important problem in urinary tract worldwide. Results of present study showed that risk of kidney stone development in older people is high. In addition, women in the age group between 65 to 74 years old and summer season were the risk factors which might increase the risk of kidney stone development.

Although there was no previous study which focused on the prevalence and risk factors of kidney stone in older adult; however, Stamatelou et al surveyed prevalence of kidney stones in the United States between 1976 to 1994 and reported that patients in two age groups (40 to 59 and 65 to 74 years) were at higher risk of kidney stones as compared to other age groups.[3] Delay in the diagnosis of stones and inadequate treatment may cause damage to the renal parenchyma and kidney failure by obstruc-tion.[26] It is believed that the occurrence of these problems in older adults is

higher due to their higher susceptibility to develop kidney diseases. In order to prevent the kidney stone in older people, they should be encouraged to consume plenty of fluids if not contraindicated. Fluid consumption is more important in older who live in hot and dry weather. Vitamin D supplements might also increase the risk of kidney stone development in the elderly.[10] Furthermore, a high dietary intake of magnesium and potassium is related to decreased risk of stone development.[8]

Our results showed that older women were at greatest risk of kidney stone development. In contrast to our finding, approximately all of the previous studies reported that men are at higher risk.[9-12] In Australia, Baker et al found that male patients were at higher risk of kidney stone development.[11] In another study, Shirazi et al reported that 66.5% of patients who developed kidney stone were men.[2] Shirazi et al reported that greatest risk of stone development in men can be related to the effect of sex hormones (androgens and estrogens) on urinary calcium and oxalate.[2] Life expectancy in women is higher than men, which in turn increases the chance of stone development in older women compared to men. Older women also have more risk factors for kidney stone development such as overweight, higher BMI and less fluid intake. It is obvious that performance of hormones which have protective role in the kidney stone development would change in older women. Indeed, in postmenopausal women, estrogen secretion decreases. This problem could tend to change in urinary calcium and calcium oxalate. These changes could increase the risk of kidney stone development in older women. Moreover, it is important to know the prevalence of different types of stones which are higher in women. Women were at greater risk of infection and calcium phosphate stones.[9,11]

Results of present study also showed that the admission rate of patients were higher in the summer and winter compared to the other seasons. Similar to our finding, most of the previous studies reported that living in hot weather conditions could increase the risk of kidney stone development.[10-13] Berto et al studied the effects of seasonal variations on the incidence of renal colic in Italy.[13] They reported that the rate of renal colics had increased in the hot and dry weather, especially when temperatures rose above 27°C and relative humidity fell below 45%.[13] Probably the higher admission rate of patients in the summer could be attributed to the decreasing urine volume in this season. Results of Nouri et al study showed that 33% of patients with kidney stone, who lived in hot area, had lower urine volume.[14] The next question would be the admission rate in the winter. Since Chaharmahal and Bakhitairi Province is one of the coldest Iranian provinces, it was logical to think that older adults would consume lower amount of water. Therefore, with decreasing intake of water, urine volume decreases and the risk of kidney stone development increases.

## Conclusion

Results of present study showed that risk of kidney stone development in older people is high. Women in age group between 65 to 74 years, summer season and living in urban area could increase the risk of kidney stone development in this group of patients. Family and Health care members who are caring for the older adults should recognize the risk factors of kidney stone development in older adults. Older adults in turn should be encouraged to drink more amounts of fluids especially in the summer and winter if not contraindicated. Older women need more attention. They should be requested to check their kidney functions routinely. They also should have more attention on the use of vitamin D and C supplements due to possibility of increasing the risk of kidney stone development.

## Limitations

Because we extracted data from patient's medical records, we had to use only the available variables in medical records. We recommend conducting a study with all potential variables.

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